

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/625,321	EDIC ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Allen C. Ho	2882	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment filed on 12 March 2010.
2. ☒ The allowed claim(s) is/are 1,3,6,7,9,11,14,15,17,19,22,23,25 and 27-29.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
  - \* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |  |
|--|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 5. <input type="checkbox"/> Notice of Informal Patent Application  |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date <u>20100618</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____    | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment  |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance                         |
|  | 9. <input type="checkbox"/> Other _____.   |

## **DETAILED ACTION**

### **EXAMINER'S AMENDMENT**

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Scott J. Asmus (Reg. No. 42,269) on 18 June 2010.

The application has been amended as follows:

- (1) Claim 9, line 1, --non-transitory-- has been inserted between "more" and "computer".
- (2) Claim 9, line 12, "the" before "gantry" has been replaced by --a--.
- (3) Claim 17, line 9, "the" before "radiation" has been deleted.
- (4) Claim 17, line 20, "the" before "frequency" has been replaced by --a--.
- (5) Claim 25, line 2, "the" after "containing" has been replaced by --a--.
- (6) Claim 25, line 11, "the" before "gantry" has been replaced by --a--.
- (7) Claim 25, line 14, "the" before "frequency" has been replaced by --a--.

### ***Allowable Subject Matter***

2. Claims 1, 3, 6, 7, 9, 11, 14, 15, 17, 19, 22, 23, 25, and 27-29 are allowed.
3. The following is an examiner's statement of reasons for allowance:

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With respect to claims 1, 3, 6, 7, and 27-29, the prior art discloses a method that comprises: rotating a distributed x-ray source and a detector array about a volume containing a heart having a cardiac cycle, wherein a rotational period of the distributed x-ray source comprises a length of time required for image reconstruction and is approximately a multiple of the cardiac cycle, wherein the distributed x-ray source comprises a plurality of addressable x-ray focal spots; emitting x-rays from the distributed x-ray source; and acquiring a projection data set comprising a plurality of projections generated from the emitted x-rays at each view location of a gantry. However, the prior art fails to disclose or fairly suggests generating a set of interpolated projections by interpolating the projection data set using phase information from the projection data set or from a set of concurrently acquired phase data and apriori frequency content of the projection data set, wherein each interpolated projection characterizes the projection data at a particular view location of the gantry and at a particular time.

With respect to claims 9, 11, 14, and 15, the prior art discloses a computer program, provided on one or more non-transitory computer readable medium, for acquiring a projection data set, wherein the computer program comprises: a routine for rotating a distributed x-ray source and a detector array about a volume containing a heart having a cardiac cycle, wherein a rotational period of the distributed x-ray source comprises a length of time required for image reconstruction and is approximately a multiple of the cardiac cycle, wherein the distributed x-ray source comprises a plurality of addressable x-ray focal spots; a routine for emitting x-rays from the distributed x-ray source, wherein the addressable x-ray focal spots of the distributed x-ray source are activated so that one or more view locations relative to the heart is substantially identical; and a routine for acquiring a projection data set comprising a plurality of projections

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generated from the emitted x-rays at each view location of a gantry. However, the prior art fails to disclose or fairly suggests a routine for generating a set of interpolated projections by interpolating the projection data set using phase information from the projection data set or from a set of concurrently acquired phase data and apriori knowledge of frequency content of the projection data set, wherein each interpolated projection characterizes the projection data at a particular view location of the gantry and at a particular time.

With respect to claims 17, 19, 22, and 23, the prior art disclose a CT image analysis system that comprises: a distributed x-ray source, disposed on a gantry and providing multiple projection data sets scanned over an angular coverage of the gantry less than about 360 degrees, wherein a rotational period of the distributed x-ray source about a volume containing a heart comprises a length of time required for image reconstruction, wherein the distributed x-ray source comprises a plurality of addressable x-ray focal spots; a detector configured to detect radiation emitted by distributed x-ray source and to generate one or more signals responsive to the radiation, wherein the detector comprises a plurality of detector elements; a system controller configured to control the x-ray source and the detector and to acquire a set of projection data during rotation of the x-ray source and the detector about a volume containing the heart comprising a length of time required for image reconstruction from one or more detector elements via a data acquisition system; and a computer system configured to receive the set of projection data. However, the prior art fails to disclose or fairly suggest a computer system configured to generate a set of interpolated projections by interpolating the set of the projection data using phase information from the set of the projection data or from a set of concurrently acquired phase data and apriori knowledge of a frequency content of the set of projection data,

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wherein each interpolated projection characterizes the projection data at a particular view location of the gantry and at a particular time to reconstruct the set of interpolated projections to generate one or more images.

With respect to claim 25, the prior art disclose a CT image analysis system that comprises: means for rotating a distributed x-ray source and detector about a volume containing a heart having a cardiac cycle, wherein the rotational period of the distributed x-ray source comprises a length of time required for image reconstruction, wherein the distributed x-ray source comprises a plurality of addressable x-ray focal spots; means for emitting x-rays from the distributed x-ray source; means for acquiring a projection data set comprising a plurality of projections generated from the emitted x-rays; and means for activating the addressable x-ray focal spots to acquire a collection of projection data at each view location of a gantry. However, the prior art fails to disclose or fairly suggests means for generating a set of interpolated projections using phase information from the projection data set or from a set of concurrently acquired phase data and apriori knowledge of a frequency content of the projection data set.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Response to Amendment***

4. Applicants' amendments filed 12 March 2010 with respect to claims 1, 9, 17, and 25 have been fully considered. The rejection of claims 1, 9, 17, and 25 under 35 U.S.C. 103(a) as being

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unpatentable over Morgan (U. S. Patent No. 6,229,870 B1) in view of Casey et al. (U. S. Patent No. 5,175,754) has been withdrawn.

### ***Conclusion***

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- (1) Flohr *et al.* (U. S. Patent No. 7,187,745 B2) disclosed a method and an apparatus for producing a computed tomography image of a periodically moving organ.
- (2) Kaufman *et al.* (U. S. Patent No. 7,142,703 B2) disclosed methods and software for self-gating a set of images.
- (3) Younis *et al.* (U. S. Patent No. 7,085,342 B2) disclosed a method for tracking motion phase of an object for correcting organ motion artifacts in x-ray CT systems.
- (4) Heuscher *et al.* (U. S. Patent No. 7,058,440 B2) disclosed dynamic computed tomography imaging using positional state modeling.
- (5) Okerlund *et al.* (U. S. Patent No. 6,526,117 B1) disclosed a method and an apparatus to minimize phase misregistration artifacts in gated CT images.
- (6) Heuscher *et al.* (U. S. Patent No. 6,510,337 B1) disclosed a multi-phase cardiac imager.
- (7) Flohr *et al.* (U. S. Patent No. 6,381,487 B1) disclosed a method and an apparatus for producing CT images.
- (8) Heuscher *et al.* (U. S. Patent No. 6,154,516) disclosed a cardiac CT system.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (571) 272-2491. The examiner can normally be reached on Monday - Friday from 9:00 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Allen C. Ho/  
Primary Examiner  
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